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Materials to the fauna of aquatic bugs of the infraorder Nepomorpha (Heteroptera) of the Javakheti Highland, Georgia

Материалы к фауне водных полужесткокрылых инфраотряда Nepomorpha (Heteroptera) Джавахетского нагорья, Грузия

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KEY WORDS: Heteroptera, Nepomorpha, *Cymatia bonsdorffii*, new records, fauna, Javakheti Highland, Georgia.

КЛЮЧЕВЫЕ СЛОВА: Heteroptera, Nepomorpha, *Cymatia bonsdorffii*, новые находки, фауна, Джавахетское нагорье, Грузия.

ABSTRACT. An annotated checklist of aquatic bugs of 12 species of nine genera and four families of the infraorder Nepomorpha from montane lakes of Javakheti higland (Georgia), is provided. *Cymatia bonsdorffii* (C.R. Sahlberg, 1819) is recorded for the first time for the fauna of Georgia.

РЕЗЮМЕ. В работе впервые приводятся сведения о 12 видах водных клопов подотряда Nepomorpha из 9 родов и 4 семейств, населяющих горные озёра Джавахетского нагорья, Грузия. *Cymatia bonsdorffii* (C.R. Sahlberg, 1819) впервые указывается для фауны Грузии.

Introduction

Javakheti Highland is a volcanic highland in southern Georgia, consisting of meridional ranges (Abul-Samsari and Javakheti) up to 3300 m a.s.l. and plateaus (Tsalka, Gomarethi and Akhalkalaki) with altitudes from 1200 to 2200 m a.s.l. [Adamia et al., 2011]. Highland is composed of andesite-basalt and trachytic lavas and most of its landscapes are represented by montane steppes and subalpine meadows. The Javakheti Highland is very rich in lentic waterbodies, including more than 60 lakes and many bogs of different succession stages. The lakes are either volcanic or glacial origin [Apkhazava, 1975]. The Javakheti Highland is strongly continental, with average annual precipitation in Akhalkalaki (the geographical and political center of the region) not exceeding 550 mm (a maximum of 100 mm in June and 25 mm on average in January, the driest month). Winter is long and cold, summer is short and cool. The average temperature of January is –7 °C, while the average of July is 12 to 13°C [Messager et al., 2013].

Studies on the fauna of waterbodies of the Javakheti Highland are scarce. There are several studies describing the biodiversity and ecological pecularities of the macrozoobenthos communities of several large lakes of the Javakheti Highland [Sadovski, 1933; Ovinnikova, 1959; Tskhomelidze et al., 1961; Pataridze, 1962, 2002; Pataridze, Gioshvili, 2015; Gabelashvili et al., 2016; Shubitidze et al., 2018].

In this paper, provide data on the fauna of aquatic bugs of the infraorder Nepomorpha from montane lakes of Javakheti Higland.

Material and methods

The field work in the Javakheti Highland was carried out in the period of 2015–2017. The investigated montane lakes are located between altitudes from 1580

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to 2870 m a.s.l. (Fig. 1). The collection of aquatic bugs is deposited in the Institute of Zoology of Ilia State University (Tbilis, Gergia) and the Laboratory of Bio-ecological Monitoring of Invertebrate Animals of Adyghea, Research Institute of Complex Problems, Adyghe State University (Maykop, Russia).

The material was collected using kick-net in lake littoral areas, followed immediate fixation of samples in 96% ethanol and labeling. Identification was performed in the laboratory using a Micromed MC-3 ZOOM Led stereo microscope. Dissection of the genitalia and mounting of the specimens was performed using the standard technique [Kerkis, 1926; Golub et al., 2012]. Coordinates of localities were determined in the field using GPS.

The annotated checklist for each species includes localities of the Javakheti Highland, the number of collected specimens and sex, with additional remarks.

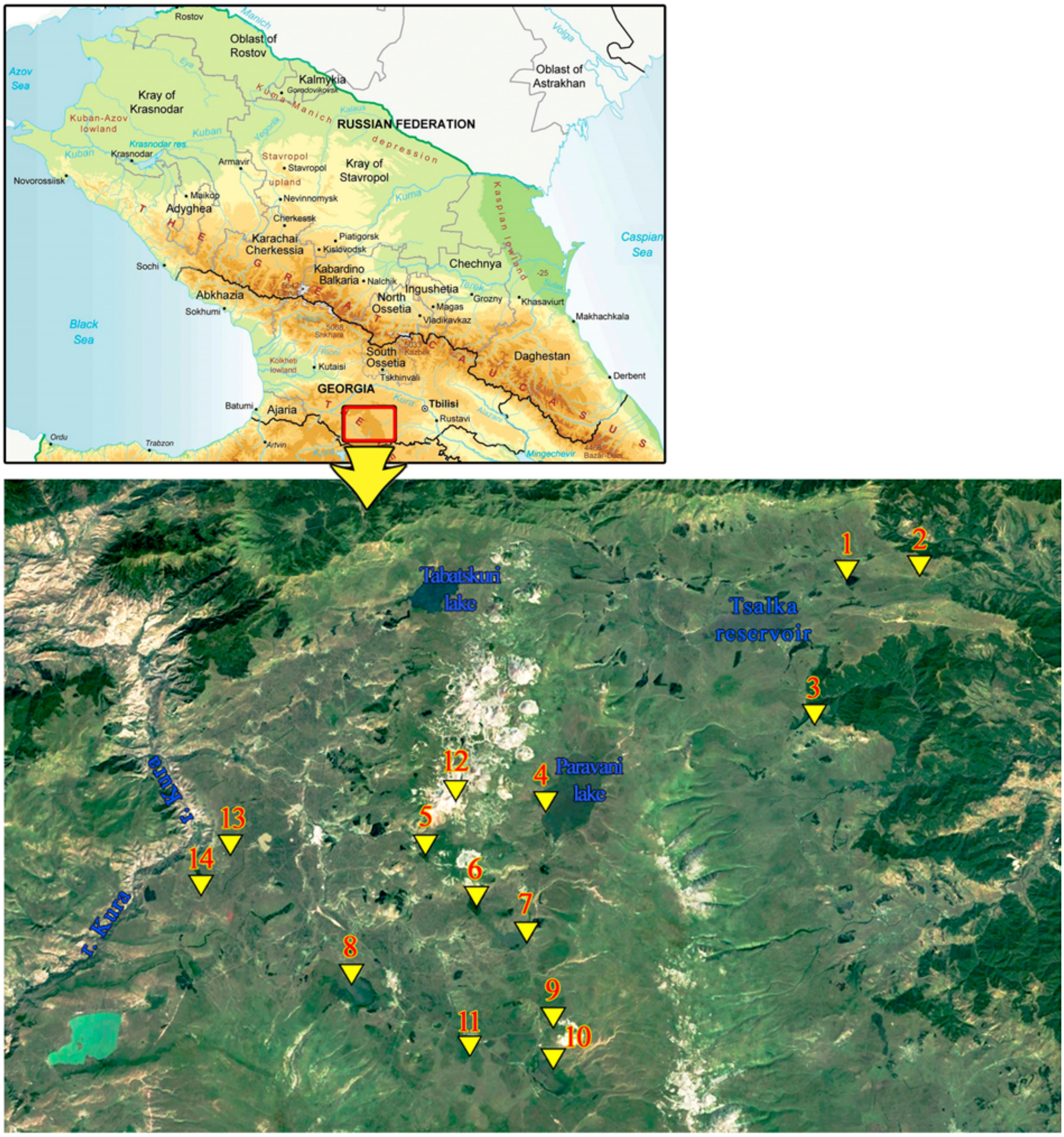


Fig. 1. Collecting sites of aquatic bugs in the Javakheti Highland, Georgia: 1 — Bareti Lake; 2 — Tba Lake; 3 — Chamligoli Lake; 4 — Paravani Lake; 5 — Abulis Lake; 6 — Avchala Lake; 7 — Saghamo Lake; 8 — Khanchali Lake; 9 — Bikentnoe Lake; 10 — Madatapa Lake; 11 — Bughdasheni Lake; 12 — Khukhuruzi Lake; 13 — Ucnobi Lake; 14 — Didi Tba Lake.

Рис. 1. Пункты сбора водных клопов на территории Джавахетского нагорья, Грузия: 1 — озеро Барети; 2 — озеро Тба; 3 — озеро Чамлиголи; 4 — озеро Паравани; 5 — озеро Абули; 6 — озеро Авчала; 7 — озеро Сагамо; 8 — озеро Ханчали; 9 — озеро Бикетное; 10 — озеро Мадатапа; 11 — озеро Бугдашени; 12 — озеро Чухурузи; 13 — озеро Уцноби; 14 — озеро Диди Тба.

Results

Annotated checklist of aquatic bugs of the infraorder Nepomorpha, from the Javakheti Highland

Infraorder **NEPOMORPHA Popov, 1968**

Family **Corixoidea Leach, 1815**

Cymatia bonsdorffii (C.R. Sahlberg, 1819)
Figs 2–6.

MATERIAL. **Ninotsminda Municipality:** near the Zhdanovka village, Madatapa lake (41°11'22.5"N 43°47'40.5"E), 2110 m a.s.l., 8.V.2015 — 2♂, 2♀; 12.X.2016 — 3♂, 3♀.

REMARKS. The species was reported from Azerbaijan (Karabakh) [Kirichenko, 1918], but in later studies this species has not been mentioned in the Caucasus. The species is present in Europe (except in the south), European part of Russia, Siberia, East Kazakhstan, Mongolia, Northeast China, the Far East [Jansson, 1995; Kanyukova, 2006]. An earlier record of the species in Turkey [Nieser, Moubayed, 1985], was proven wrong [Fent et al., 2011]. The species is recorded for the first time in Georgia.

Cymatia coleoptrata (Fabricius, 1777)

MATERIAL. **Dmanisi Municipality:** 1.3 km N Sarkineti village, Chamligoli Lake (41°30'34.6"N 44°07'14.5"E), 1580 m a.s.l., 15.V.2017 — 2♂, 3♀.

REMARKS. The species has been recorded in Georgia in the Turtle (Cherepashye) lakes near Tiflis (Tbilisi) [Kirichenko, 1930].

Monticorixa armeniaca (Štys, 1975)

MATERIAL. **Akhalkalaki Municipality:** Khkhuruzi Lake, (41°26'13.6"N 43°39'49.3"E), 2870 m a.s.l., 2.VIII.2016 — 1♀, 1♂.

REMARKS. In the Caucasus, the species has been recorded in Armenia [Jansson, 1995] and Georgia [Kanyukova, 2006].

Callicorixa raddei (Kirichenko et Jaczewski, 1960)
Figs 7–12.

MATERIAL. **Ninotsminda Municipality:** 3 km N Poka village, Paravani Lake (41°25'34.4"N 43°46'49.0"E), 2080 m a.s.l., 13.X.2016 — 1♂; Avchala Lake (41°20'10.7"N 43°41'22.2"E), 2055 m a.s.l., 12.V.2016 — 3♀, 2♂; Biketnoye Lake, (41°13'11.6"N 43°46'33.2"E) 2175 m a.s.l., 11.V.2016 — 1♀, 1♂; Khanchali Lake (41°15'47.7"N 43°32'09.3"E), 1928 m a.s.l., 2.VIII.2015 — 9♀, 3♂; near the Saghamo village, Saghamo Lake (41°18'05.7"N 43°45'23.9"E), 1984 m a.s.l., 31.X.2015 — 1♂; near the Zhdanovka village, Madatapa Lake (41°11'22.5"N 43°47'40.5"E), 2110 m a.s.l., 8.V.2015 — 3♀; upper reaches of the Zagranichnaia river, Bughdasheni Lake (41°11'56.9"N 43°41'14.0"E), 2040 m a.s.l., 5.VIII.2015 — 3♀; 4.VIII.2015 2♀, 2♂; 2.XI.2015 — 2♀, 2♂; **Akhalkalaki Municipality:** Ucnobi Lake (41°23'10.19"N 43°22'48.40"E), 1760 m a.s.l., 16.V.2016 — 3♀, 2♂.

REMARKS. Kirichenko [1918] recorded *Callicorixa praeusta* (Fieb.) in Georgia (Bakuriani, Tabatskuri). Later, Kirichenko and Jaczewski [1960] described the species *Callicorixa raddei* (as *Sigara* (*Callicorixa*) *raddei*) based on materials from Georgia (Bakuriani), Armenia (lakes of Sevan, Jil, Yerevan, Leninakan) and Turkey. According to Kanyukova [2006], all records of *C. praeusta* in Georgia and Armenia should be considered as *C. raddei*. Our findings also confirm the later suggestion.

Corixa dentipes Thomson, 1869

MATERIAL. **Ninotsminda Municipality:** Abuli Lake (41°23'06.5"N 43°37'26.0"E), 2185 m a.s.l., 18.V.2016 — 1♂; Khanchali Lake (41°14'35.1"N 43°33'40.4"E), 1928 m a.s.l., 2.VIII.2015 — 2♂; near the Zhdanovka village, Madatapa Lake (41°11'22.5"N 43°47'40.5"E), 2110 m a.s.l., 11.V.2016 — 1♂.

REMARKS. In Georgia, the species was recorded in Tba Lake and Gveleti village [Kirichenko, 1930].

Hesperocorixa linnaei (Fieber, 1848)

MATERIAL. **Ninotsminda Municipality:** Tba Lake, (41°39'58.3"N 44°15'48.2"E), 1760 m a.s.l., 17.V.2017 — 2♂, 1♀.

REMARKS. In Georgia, the species was recorded in Tiflis (Tbilisi) [Kirichenko, 1918].

Sigara (*Retrocorixa*) *limitata limitata* (Fieber, 1848)

MATERIAL. **Ninotsminda Municipality:** Avchala Lake (41°20'10.7"N 43°41'22.2"E), 2055 m a.s.l., 12.V.2016 — 1♂.

REMARKS. In Georgia, the species was recorded in Tiflis (Tbilisi) [Kirichenko, 1918].

Sigara (*Sigara*) *striata* (Linnaeus, 1758)

MATERIAL. **Tsalka Municipality:** Bareti Lake (41°39'35.6"N 44°10'05.5"E), 1625 m a.s.l., 17.V.2017 — 1♂; **Ninotsminda Municipality:** 3 km N Poka village, Paravani Lake (41°25'34.4"N 43°46'49.0"E), 2080 m a.s.l., 13.X.2016 — 4♂, 6♀; Upper reaches of the Zagranichnaia river, Bughdasheni Lake (41°11'56.9"N 43°41'14.0"E), 2040 m a.s.l., 2.XI.2015 — 3♀, 4♂.

REMARKS. Georgia [Kanyukova, 2006].

Family **Naucoridae Leach, 1815**

Ilyocoris cimicoides cimicoides (Linnaeus, 1758)

MATERIAL. **Tsalka Municipality:** Bareti Lake (41°39'35.6"N 44°10'05.5"E), 1625 m a.s.l., 17.V.2017 — 1♂; **Ninotsminda Municipality:** Avchala Lake (41°20'10.7"N 43°41'22.2"E), 2055 m a.s.l., 1.VIII.2016 — 12 lav.; **Akhalkalaki Municipality:** (41°21'12.2"N 43°20'28.3"E), Didi Tba Lake, 1780 m a.s.l., 31.VII.2016 — 6 larv.

REMARKS. In Georgia, the species was recorded in Tiflis (Tbilisi) and Bacuriani [Kirichenko, 1918].

Family **Notonectidae Latreille, 1802**

Notonecta (*Notonecta*) *reuteri* Hungerford, 1928

MATERIAL. **Ninotsminda Municipality:** 3 km N Poka village, Paravani Lake (41°25'34.4"N 43°46'49.0"E), 2080 m a.s.l., 30.VII.2016 — 1♀; Avchala Lake (41°20'10.7"N 43°41'22.2"E), 2055 m a.s.l., 1.VIII.2016 — 1♂; near the Zhdanovka village, Madatapa Lake (41°11'22.5"N 43°47'40.5"E), 2110 m a.s.l., 1.VIII.2015 — 1♂, 1♀.

REMARKS. Records of *Notonecta lutea* Müller, 1776 from Georgia (Tabatskuri lake) by Kirichenko [1918], belong to *Notonecta reuteri* [Kanyukova, 2006].

Notonecta (*Notonecta*) *viridis* Delcourt, 1909

MATERIAL. **Akhalkalaki Municipality:** (41°21'12.2"N 43°20'28.3"E), Didi Tba Lake, 1780 m a.s.l., 31.VII.2016 — 2♀.

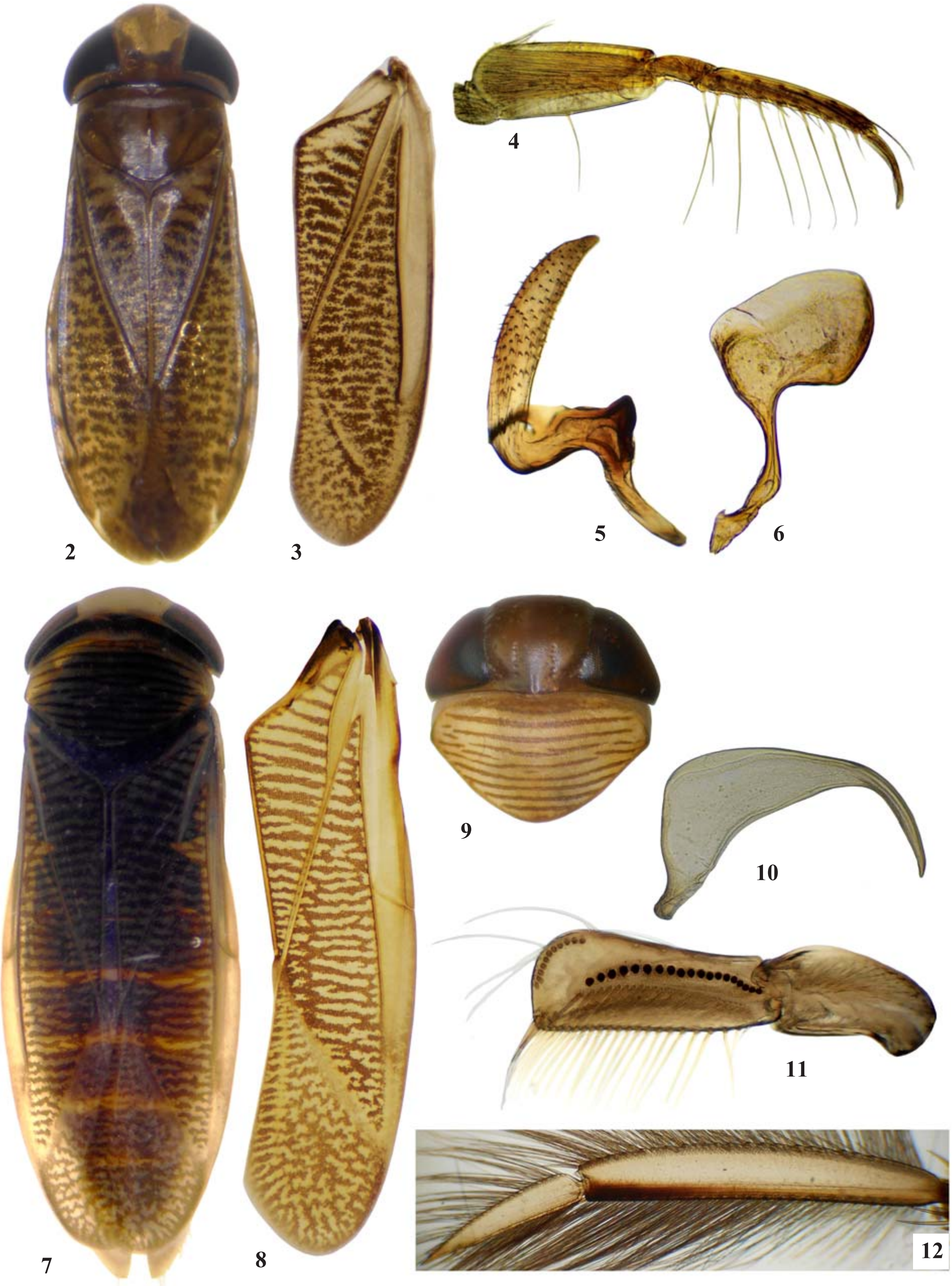
REMARKS. In Georgia, this species was recorded as *Notonecta marmorea*, in Tiflis (Tbilisi), Bakuriani, Borjomi, Lagodekhi, Shakriani, Dedoplistskaro [Kirichenko, 1930].

Family **Pleidae Fieber, 1851**

Plea minutisima minutisima Leach, 1817

MATERIAL. **Dmanisi Municipality:** 1.3 km N Sarkineti village, Chamligoli Lake (41°30'34.6"N 44°07'14.5"E), 1580 m a.s.l., 15.V.2017 — 2♂; **Akhalkalaki Municipality:** (41°21'12.2"N 43°20'28.3"E), Didi Tba Lake, 1780 m a.s.l., 31.VII.2016 — 12 specimens.

REMARKS. In Georgia, this species was recorded in Tiflis (Tbilisi) [Kirichenko, 1918]; and later as *Plea atomaria* (Pallas, 1771) also in Tiflis (Tbilisi) [Kirichenko, 1930].



Figs 2–12. 2–6 — *Cymatia bonsdorffii*; 7–12 — *Callicorixa raddei*; 2, 7 — imago habitus; 3, 8 — hemelytron; 4, 11 — ♂ pala (ventral view); 5 — left paramere; 6, 10 — right paramere; 9 — head and pronotum; 12 — metatarsus.

Рис. 2–12. 2–6 — *Cymatia bonsdorffii*; 7–12 — *Callicorixa raddei*; 2, 7 — имаго; 3, 8 — надкрылье; 4, 11 — передняя лапка ♂ (снизу); 5 — парамер левый; 6, 10 — парамер правый; 9 — голова и переднеспинка; 12 — задняя лапка.

In total 12 species of aquatic bugs were found in the lakes of Javakheti Highland. Apparently, further research should also provide additional data for this area since the most of the lotic and lentic systems are yet to be studied. Since the Javakheti Highland is an important conservation target [Matcharashvili et al., 2004], we hope that the knowledge of the regional invertebrate biodiversity will trigger further research in the region as well as help in conservation prioritization and establishing biological monitoring programs.

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